(No Model.)

F. H. RICHARDS.

ELEVATOR.

No. 600,033. Patented Mar. 1, 1898.

Fig. 1.

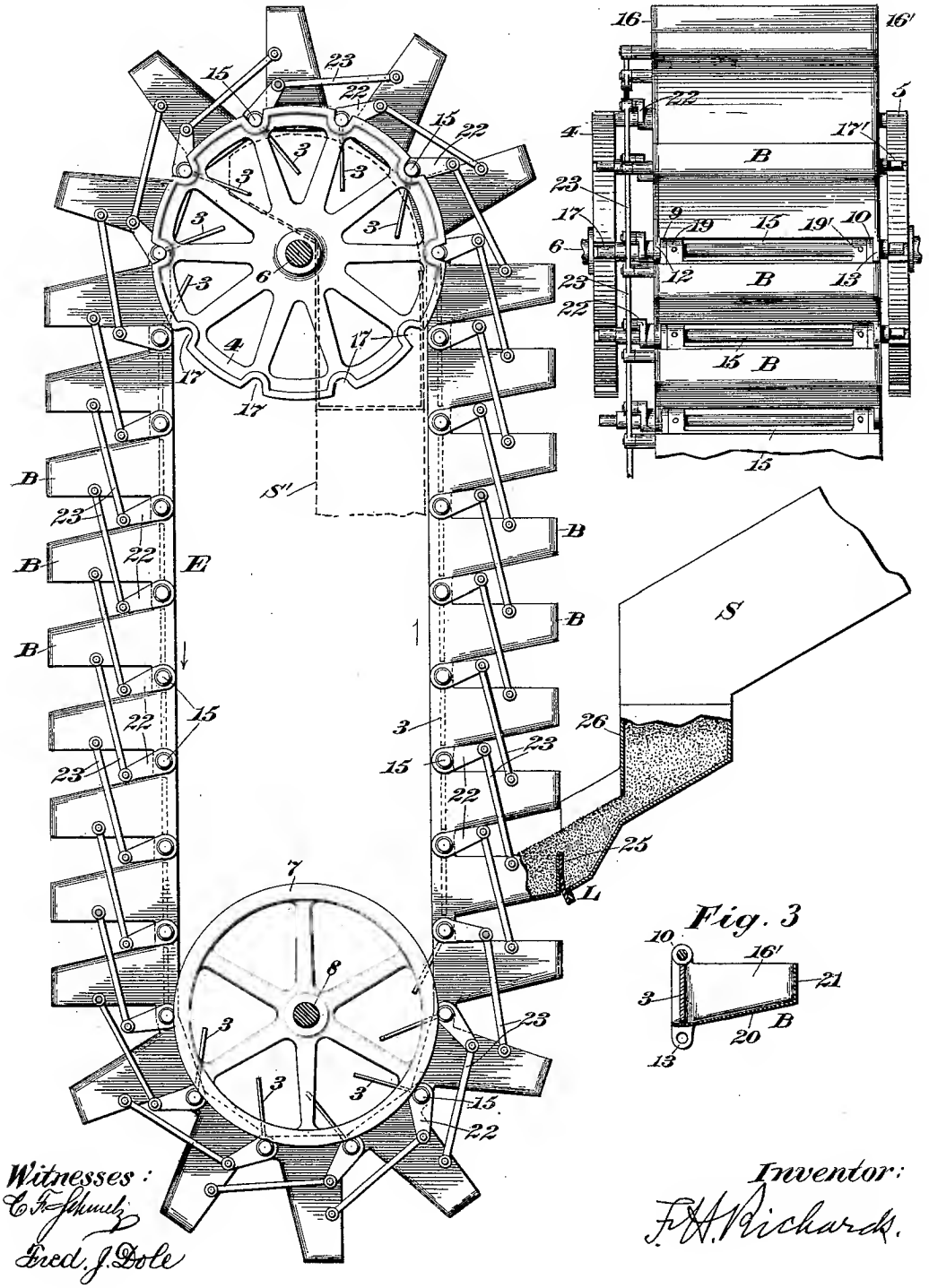

Fig. 2.

Fig. 3

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ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 600,033, dated March 1, 1898.

Application filed October 27, 1897. Serial No. 656,559. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

This invention relates to apparatus of that class commonly known as "grain-elevator" mechanisms.

One object of my present invention is to furnish an improved and effective mechanism especially adapted for elevating large quantities of material while running at a moderate speed, the construction and organization of the elements of said mechanism being such that material may be supplied in practically a continuous stream to the buckets of the elevator without waste and during the progressively-advancing movement thereof.

A further object of the invention is to furnish an elevator mechanism comprehending an endless conveyer including a series of pivotally-connected buckets, each having a hinged closer, supporting and driving means for said conveyer, and closer-actuating devices so constructed and organized that opening and closing movements will be imparted to the closers of successive buckets at predetermined points in the traveling movements of the conveyer, whereby the contents of the buckets may be discharged into a chute or receptacle located within the circuit, thereby rendering the elevator compact in organization and economizing in the space required for the operation thereof.

A further object of the invention is to furnish an elevator mechanism comprehending a conveyer-chain including an oblong circuit of buckets pivotally connected together, rotary carriers disposed within said circuit and supporting opposite curved portions of the conveyer-chain, shiftable closers for normally closing the open ends of the buckets, means effective at predetermined points in the traveling movements of the buckets in their curvilinear path for actuating the closers to open and close the same successively, a supply-conduit supported in operative relation with the outer receiving ends of the buckets and having a cut-off plate extending upward from the material-supporting face thereof in position for bearing at its outer face against the outer walls of the successive buckets during the traveling movement thereof, said plate being of such length as to bridge the space between the bucket being filled and the next succeeding bucket during the ascending movements of said buckets and until the next succeeding bucket arrives at a position to be filled by the conduit, and a chute supported within the circuit of the conveyer-chain in position to receive the material discharged from the buckets.

In the drawings accompanying and forming part of this specification, Figure 1 is a side elevation, partially in section, of a conveyer mechanism embodying my present improvements, one bucket of the conveyer thereof being shown in the position it occupies with relation to the supply-conduit when being filled thereby, the cut-off plate of said supply-conduit being shown with its outer face in contact with the outer face of the outer end wall of the bucket and the upper edge of said cut-off plate being shown flush with the upper edge of the outer wall of said bucket. Fig. 2 is a front elevation of a portion of the upper part of the elevator, and Fig. 3 is a vertical cross-section of one of the conveyer-buckets detached.

Similar characters designate like parts in all of the figures of the drawings.

The elevator mechanism in the preferred form thereof (shown most clearly in Fig. 1 of the drawings) may be said to comprise three essential elements—to wit, an elevator or conveyer proper, which is designated in a general way by E, a supply apparatus, which is designated in a general way by S, and a discharge apparatus, which is designated in a general way by S'.

The elevator or conveyer E is shown comprising an endless conveyer-chain consisting of an oblong circuit of pivotally-connected buckets, each of which is designated by B and each of which is furnished with a shiftable closer 3, the closer of each bucket being operatively connected with the next succeeding bucket by means of an actuator, hereinbefore described, two driving and supporting wheels 4 and 5, fixed to a horizontally-disposed driving-shaft 6, which may be journaled in suitable bearings, (not shown,) and

which wheels support the upper curved portions or transverse run of the conveyer-chain, and two guide or idle wheels, one only of which is shown in the drawings, and which is designated by 7, supported on a shaft 8, and around which wheel the lower transverse run of the conveyer-chain extends.

As a convenient means for pivotally connecting the buckets B together each bucket is shown having at the upper side, near the inner end thereof, two upwardly-projecting ears 9 and 10, and at the lower side, near the inner end thereof, two depending ears 12 and 13, the adjacent ears of adjacent buckets being so disposed as to overlap one another when the buckets are assembled, as will be readily understood by reference to Fig. 2. These ears are perforated to receive shafts 15, which extend through the overlapping ears of adjacent buckets and constitute the pivots around which said buckets swing during their circuitous movement. These shafts 15 are shown projecting at opposite ends considerably beyond opposite side faces 16 and 16′ of the buckets and as having their extreme outer ends reduced (which is optional) and in position to engage the sprockets 17 and 17′ (shown as indentations) in the two sprocket or driving wheels 4 and 5, which sprocket-wheels constitute the drivers for the endless conveyer-chain and may be driven in any suitable manner and by any suitable means. (Not shown.)

In the preferred form thereof (shown most clearly in Figs 1 and 3 of the drawings) each closer 3 of a bucket is fixed to the shaft 15, which pivotally connects said bucket to the ends of the next adjacent bucket, said closer having at opposite ends thereof ears 19 and 19′, which are fixed to said shaft.

Each bucket B is shown in the nature of a tray comprising two side walls 16 and 16′, an inclined bottom wall 20, and an outer end wall 21, said bucket being open at its top and being furnished with a closer at the inner end thereof, and the inner end of said bucket being preferably of greater depth than the outer end thereof.

By pivotally connecting adjacent buckets at their upper and lower rear edges it will be seen that during their travel around the chain-wheels 4 and 5 said buckets will be rigidly supported with their inner edges in a plane tangent to the arc in which the bucket moves, the shafts intermediate the adjacent inner ends of successive buckets holding the buckets with their longitudinal axis substantially radial to the axis of rotation of the sprocket-wheels 4 and 5 during their travel around said wheels.

As a simple and convenient means for actuating the closers of the buckets successively to impart an opening-and-closing movement thereto during their traveling movement over the upper portion of the sprocket-wheels I have provided in operative connection with each closer a closer-actuator, which, in the preferred form thereof, (shown most clearly in Figs. 1 and 2 of the drawings,) comprises a linkage operatively connecting each closer with the next adjacent bucket. This linkage is shown consisting of a crank-arm 22, fixed at its inner end to one end of the pivot-shaft 15 outside of the side face 16 of the bucket and having its longitudinal axis at such an angle to the plane of the closer that when said closer is in its shut position the crank-arm will be inclined upwardly with relation to an imaginary line drawn at right angles to the plane of said closer, and a link 23, pivotally connected at one end to the outer end of said crank-arm 22 and at its opposite end to the side wall of the next succeeding bucket at a point substantially midway between the pivotal point and outer end of said bucket, the crank-arm 22 and link 23 of each closer-actuator being shown disposed substantially at right angles to one another when the buckets are in their horizontal positions or during their travel in a vertical plane.

By constructing and organizing the closer-actuators as hereinbefore described it will be seen that during the traveling movement of the bucket from a horizontal position to a position radial to the axis of the sprocket-wheels 4 and 5 the linkage of each actuator will, owing to the change in angular relations of the successive buckets as they are carried over the sprocket-wheels, be straightened, thus changing the angle of the crank-arm 22 with relation to the bucket to which its closer is pivoted and causing the same to impart an opening movement to the closer fixed thereto and effecting a discharge of the contents of said bucket.

I do not desire to limit myself to the particular construction and organization of bucket-closer actuator shown in the accompanying drawings, as this might be modified without departure from my invention.

The discharge-chute S′ (shown in dotted lines in Fig. 1) may be of any suitable construction and is shown located between the two chain-wheels and between the two side runs of the conveyer-chain, with its receiving end in juxtaposition to the upper run of the chain-wheel.

The supply apparatus S is shown as a supply-chute having at the extreme forward end thereof a vertically-disposed cut-off plate 25, whose outer face is substantially parallel to and bears against the outer face of the front wall of the bucket when said bucket is in its load-receiving position, as indicated at L, Fig. 1, this cut-off plate being of a length sufficient to bridge the space between the filled bucket and the next adjacent bucket during the traveling movement of said filled bucket from the filled position thereof (shown at L, Fig. 1) to its next successive position, thus insuring a substantially continuous discharge of material into successive buckets without waste, as it will be seen that when the bucket B rises from the filled position

(shown at L, Fig. 1) the front wall thereof will cut through material being supplied and bridge the opening between the upper edge of the cut-off plate 25 and the preceding bucket, and a succeeding bucket will simultaneously ascend and bridge the space between the lower edge of the cut-off plate and the front wall of said succeeding bucket.

The supply-chute S is shown having a vertically-disposed retarding or baffle plate 26 intermediate the receiving and discharging ends thereof, with its lower edge somewhat above the upper edge of the cut-off plate 25 and in position to control the volume and velocity of the material passing from the main portion of the supply-chute to the discharge end of said chute,

During the first travel of the conveyer-chain through the first quadrant of its curvilinear movement an opening movement will be imparted to the closers, and during the travel of said conveyer-chain through the next succeeding quadrant of its curvilinear movement a closing movement will be imparted to said closers, said closers being retained in their closed positions during the travel of the buckets along the vertical runs thereof, as will be readily appreciated by reference to Fig. 1 of the drawings.

From the foregoing description it will be seen that the buckets may be filled during the progressive advancing movement thereof and while in horizontal positions, which is a material departure from the usual "scoop" method of filling conveyer-buckets, and it will be furthermore apparent that a very large quantity of material may be elevated and discharged with its elevator running at a very moderate speed.

It will be further seen that by filling the buckets when said buckets are in their horizontal positions the conveyer-chain, of which said buckets constitute a part, is not subjected to the excessive strain that they would be subjected to if the material were scooped up by said buckets during the travel thereof around the lower end of the circuit, as in elevators of ordinary construction.

Furthermore, each bucket will be substantially uniformly supplied and the weight of the material therein will, owing to the increased depth of the bucket at the inner end thereof, be greater at the inner end than at the outer end thereof.

Having described my invention, I claim—

1. An elevator including a series of pivotally-connected buckets each having a hinged closer, and a closer-actuating device connecting the closer of one bucket to another bucket.

2. An elevator including a series of pivotally-connected buckets each having a discharge-opening at the inner end thereof; a closer in connection with each bucket and normally covering the discharge-opening thereof; and a closer-actuator operatively connecting the closer of each bucket with the next adjacent bucket.

3. An elevator including a series of buckets open at their tops and having discharge-openings at their inner ends, and each bucket having a hinged closer for normally covering the inner end thereof; and closer-actuating devices operatively connecting the closers of preceding buckets with succeeding buckets.

4. An elevator including a series of pivotally-connected buckets each having a discharge-opening; a hinged closer for normally covering said opening; actuating devices operatively connecting the closers of preceding buckets with succeeding buckets and each including a crank-arm fixed to the closer.

5. An endless conveyer or elevator comprehending a series of pivotally-connected conveyer-buckets having discharge-openings at their inner ends; a hinged closer in operative connection with the discharge end of each bucket; and actuating linkage operatively connecting preceding closers with succeeding buckets, whereby changes in angular relations of said buckets will effect opening movements of the closers.

6. An endless elevator or conveyer-chain comprising a circuit of receivers or buckets pivotally connected together at their inner ends and each having a discharge-opening at said inner end; a closer pivotally supported on each of said buckets with its axis of movement coincident with the pivotal point of said bucket; and means connecting preceding closers with succeeding buckets and organized to impart opening movements to the closers at predetermined points in the circuitous movement thereof.

7. An elevator including a series of pivotally-connected buckets each having a discharge-opening; a closer hinged to each bucket and normally covering the discharge-opening thereof; and actuating devices operatively connecting preceding closers with succeeding buckets and each consisting of a crank-arm and a link, the former of which is fixed to one closer and the latter of which is pivotally connected at one end to the outer end of said crank-arm and at its opposite end to an adjacent bucket at a point intermediate the inner and outer ends thereof.

8. An elevator mechanism comprising a driving-shaft; two sprocket-wheels fixed to opposite ends of said shaft; a guide-wheel supported below said sprocket-wheels; a conveyer-chain extending around said wheels and comprising a series of buckets open at their inner ends; shafts pivotally connecting the buckets together and having end portions extending beyond the side walls of said buckets and adapted to be engaged by the sprockets of the sprocket-wheels; a closer fixed to each pivot-shaft; a crank-arm fixed to each pivot-shaft; and a link pivotally connected at one end to the outer end of each crank-arm and at its opposite end to a bucket.

9. An elevator mechanism including a conveyer-chain comprising a circuit of pivotally-connected buckets open at their inner ends;

shafts pivotally connecting the upper and lower inner ends of adjacent buckets together and having end portions thereof projecting beyond the side faces of said buckets in position to be engaged by sprockets of driving-wheels; a series of closers fixed to the successive shafts in position for covering the openings of said buckets; a series of outwardly-projecting crank-arms fixed one to each shaft; and a series of links pivotally connecting the outer ends of the crank-arms of preceding buckets to succeeding buckets.

10. An elevator mechanism comprising a driving-shaft; two sprocket-wheels fixed to opposite ends of said shaft; a guide-wheel supported below said sprocket-wheels; a conveyer-chain extending around said wheels and comprising a series of buckets open at their inner ends; shafts pivotally connecting the buckets together and having end portions extending beyond the side walls thereof and adapted to be engaged by the sprockets of the sprocket-wheels; a closer fixed to each pivot-shaft; a crank-arm fixed to each pivot-shaft; a link pivotally connected at one end to the outer end of each crank-arm and at its opposite end to the bucket; a discharge-conduit supported between the chain-wheels and having its receiving-openings in juxtaposition to the curvilinear path of movement of the successive buckets; and a supply-chute located intermediate the upper and lower wheels at one side the vertical run of the conveyer-chain and having a vertically-disposed cut-off plate at the discharge end thereof in position for successively bridging the spaces between the outer ends of adjacent buckets during their advancing movement.

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